

CLAIMS

What is claimed is:

1. A computer system, comprising:
 - a processor;
 - a system memory coupled to said processor;
 - at least one input/output device coupled to said processor;
 - an internal audio speaker device; and
 - an audio controller circuit that transmits digital audio signals or analog audio signals to the internal audio speaker or to external audio playback devices coupled to the computer via a plurality of output connectors;wherein the audio controller circuit determines whether each device is analog or digital for the purpose of transmitting corresponding analog or digital audio signals to each device.
2. The computer system of claim 1 wherein:
 - audible sounds are transmitted to and reproduced by one playback device at a time; and
 - wherein the audio controller circuit detects the device type for that one playback device and transmit analog or digital signals as required for that device.
3. The computer system of claim 1 further comprising:
 - a front audio connector; and
 - a rear audio connector;

4 wherein audio signals are transmitted by the audio controller circuit for playback by one of
5 either the internal speaker device or a playback device coupled to the rear connector or a playback
6 device coupled to the front audio connector.

1 4. The computer system of claim 3 wherein:
2 playback devices coupled to the rear connector have playback priority over the internal
3 speaker device; and
4 playback devices coupled to the front connector have playback priority over playback
5 devices coupled to the rear connector and the internal speaker device.

1 5. The computer system of claim 4 wherein the audio controller circuit determines whether to
2 transmit analog or digital signals under the following conditions:
3 a) when a playback device is coupled to or removed from the front connector; and
4 b) when no playback device is coupled to the front connector and a playback device is
5 coupled to or removed from the rear connector.

1 6. The computer system of claim 5 wherein:
2 if no external playback device is coupled to the computer system, the audio controller
3 circuit transmits analog audio signals for playback by the internal speaker device.

1 7. An audio controller circuit that generates audible sounds for use on a computer system
2 comprising:

3 a digital audio controller that generates digital audio signals reproducible by a digital audio
4 device;

5 a mixed-signal codec that communicates with the digital audio controller and generates
6 analog audio signals reproducible by an analog audio device;

7 a programmable logic device;

8 a plurality of audio output connectors, each configured to accept a mating connector
9 coupled to an external audio device; and

10 a switching circuitry;

11 wherein the audio controller circuit detects whether an external audio device coupled to an
12 output connector is an analog or digital device and transmit either analog or digital audio signals to
13 any of the output connectors.

1 8. The audio controller circuit of claim 7 further comprising:

2 an internal analog output that transmits analog audio signals to an internal computer
3 speaker if none of the output connectors are coupled to audio devices.

1 9. The audio controller circuit of claim 8 wherein the output connectors comprise:

2 a front output connector; and

3 a rear output connector;

4 wherein if the front output connector is coupled to an external audio device, the audio
5 controller circuit:

6 asserts a first mute signal to mute the rear output connector; and

7 asserts a second mute signal to mute the internal analog output; and

8 wherein if the front output connector is not coupled to an external audio device and the rear
9 output connector is coupled to an external audio device, the audio controller circuit:
10 asserts the second mute signal to mute the internal analog output.

1 10. The audio controller circuit of claim 9 wherein the switching circuit further comprises a
2 digital output switch that:
3 transmits digital audio signals to the front output connector when the first mute signal is
4 asserted; and
5 transmits digital audio signals to the rear output connector when the first mute signal is de-
6 asserted.

7 11. The audio controller circuit of claim 9 wherein the switching circuit further comprises
8 analog output muter that uses the first and second mute signals to selectably mute or transmit
9 analog audio signals to the outputs such that:
10 if the first mute signal is asserted, the muter does not transmit analog audio signals to the
11 rear output connector; and
12 if the second mute signal is asserted, the muter does not transmit analog audio signals to the
13 internal analog output.

14 12. The audio controller circuit of claim 11 wherein the switching circuit further comprises a
15 detection switch that:
16 transmits detection signals from the front output connector to the codec when the first mute
17 signal is asserted; and

5 transmits detection signals from the rear output connector to the codec when the first mute
6 signal is de-asserted.

1 13. The audio controller circuit of claim 12 wherein:
2 the programmable logic device transmits an interrupt that instructs the digital audio
3 controller and codec to transmit an analog test tone to the muter when the value of either the first
4 mute signal or the second mute signal changes.

1 14. The audio controller circuit of claim 13 wherein:
2 if the codec receives a detection signal, the audio controller circuit transmits analog audio
3 signals; and
4 if the codec does not receive a detection signal, the audio controller circuit transmits digital
5 audio signals.

1 15. A method of transmitting analog or digital audio signals to one of a plurality of computer
2 system audio outputs comprising:
3 ranking the audio outputs in terms of playback priority;
4 transmitting audio signals from an audio controller circuit to the highest priority audio
5 output to which an audio device is coupled;
6 wherein:
7 if a playback device is removed from the audio output to which audio signals are
8 currently being transmitted; or
9 if a playback device is plugged into a higher priority output;

10 determining the device type for the audio device coupled to the highest priority audio
11 output and transmitting the appropriate analog or digital audio signals to that output.

1 16. The method of claim 15 further comprising:

2 generating an interrupt to indicate to the computer system that a device type must be
3 determined.

1 17. The method of claim 16 the process of determining the device type further comprises:

2 transmitting an analog test-tone to the highest priority output device; and

3 detecting whether the analog test tone is grounded by the output device;

4 wherein if the test tone is grounded, the device is a digital device and wherein if the test tone is
5 detected, the device is an analog device.

1 18. The method of claim 17 wherein the test tone is transmitted to the right channel of a stereo
2 output device.

1 19. The method of claim 17 wherein the audio signals and test tone are directed to and from the
2 highest priority output device using switches.

1 20. The method of claim 16 wherein the interrupt is generated by a programmable logic device
2 and the duration of the interrupt is 500 microseconds.